Claims

1. Apparatus for converting an M-bit digital signal into an analogue signal, the apparatus comprising:

means for mapping the M-bit digital signal to first and second digital values u and v, so that the ratio of u/v to the maximum value of u/v is equal to or approximates the ratio of the M-bit digital signal to the maximum value of that signal;

first and second digital to analogue converters, the first digital to analogue converter having an input for receiving said first digital value and the second digital to analogue converter having an input for receiving said second digital value; and

circuit means coupled to the analogue outputs of the digital to analogue converters for dividing one of the analogue outputs by the other, and for providing the result to an output.

2. Apparatus according to claim 1, wherein the bit length N of the first digital value u is the same as that of the second digital value v.

3. Apparatus according to claim 1 or 2, wherein said means for mapping comprises a memory storing a look-up table, the look-up table containing all possible values of said M-bit digital signal and respective first and second value pairs u,v.

4. Apparatus according to any one of the preceding claims, wherein the means for mapping comprises means for compressing said M-bit digital signal by a factor A, said circuit means comprising means for scaling the result of said division by the same factor A.

5. A method of converting an M-bit digital signal into an analogue signal, the method comprising:

mapping the M-bit digital signal to first and second digital values u and

v, so that the ratio of u/v to the maximum value of u/v is equal to or approximates the ratio of the M-bit digital signal to the maximum value of that signal;

applying said first and second digital values to inputs of the first and second digital to analogue converters respectively; and

dividing the analogue output of one of the digital to analogue converters by the other, and providing the result to an output.

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6. Apparatus which is configurable to evaluate a function, the apparatus comprising:

a plurality of scaling elements, each scaling element having a first input for receiving an analogue input signal, a second input, and an output;

control means for generating a digital weight for one or more of said scaling elements, and having output means for applying generated weights to the second inputs of respective scaling elements;

output means having a plurality of inputs coupled to outputs of respective scaling elements to receive scaling products therefrom, a plurality of outputs selectively coupled to respective inputs, and means for selectively coupling inputs or outputs together, the control means being coupled to the output means for effecting the selective coupling.

7. Apparatus according to claim 6, wherein said scaling elements are multiplication elements, division elements, or elements configurable to perform either multiplication or division.

8. Apparatus according to claim 7, wherein said scaling elements are multiplying digital to analogue converters.

9. Apparatus according to any one of claims 6 to 8, wherein the apparatus is configurable to operate as a vector dot product multiplier.

10. Apparatus according to claim 6, wherein each scaling element comprises a digital to analogue converter having its digital input coupled to the second input of the element so as to receive a digital weight from the control means.

11. Apparatus according to claim 10, wherein each digital to analogue converter receives at a control input thereof said analogue input signal, the output of each digital to analogue converter being coupled to the output of the scaling element to provide at the output, the multiplication product.

12. Apparatus according to claim 1, wherein the output means comprises a first plurality of switches for selectively coupling neighbouring inputs of the output means together, and a second plurality of switches coupling inputs of the output means to respective outputs.

13. Apparatus according to claim 6, wherein outputs of the output means are selectively coupled to provide feedforward to the scaling elements.

14. Apparatus according to claim 13 and comprising, for each scaling element, summing means for summing an initial weight with a value present at one of the outputs of the output means, with the result being applied as the weight to the second input of the scaling element.

15. A method of evaluating a polynomial function using apparatus according to claim 6, the method comprising:

factorising the polynomial function so as to put it into a form containing nested multiply and accumulate terms;

applying a function variable to first inputs of at least certain of the scaling units and applying function constants as weights to second inputs of at least certain scaling units; and

configuring the apparatus so that components of each multiply and accumulate term are evaluated by respective scaling elements and summed

by the output means, with each intermediate sum being fed forward to a scaling element evaluating a component of the next order multiply and accumulate term.

16. A method according to claim 15 and comprising coupling together those inputs of the output means which provide components to be summed together, and coupling the coupled inputs to either an output of the output means or to a second input of a further scaling element.

17. A method according to claim 15, wherein coupled inputs to the output means are coupled to a scaling element via a summing junction which also receives a weight representing a function constant, with the output of the summing junction being coupled to a second input of the scaling element.